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Novel Methods to Overcome Disaster and Tropical Infectious Diseases

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ABSTRACT

As described in Japanese essay, Hojoki which was written by Chomei Kamono at Kyoto around 1200, various disasters such as big fires, earthquakes, relocations of capitals followed by famines hit Kyoto in Japan. Not only in Japan, all of the countries in the world have been suffering from the disasters. Recently, natural disasters are increasing due to global warming. There were three times as many natural disasters from 2000 through 2009 as there were from 1980 through 1989. Because tropical-infectious diseases are often disaster-related infectious diseases (DRIDs), the strategies against the former could be applicable to DRIDs. In turn, infectious diseases could themselves be regarded as constituting natural disasters such as HIV and COVID-19. In situations of disasters, it is desirable if you can identify the pathogen and identify disease severity simultaneously. Adipstick DNA chromatography assay termed as Single-Tag Hybridization-Printed Array Strip (STH-PAS) system was developed based on the DNA sequences of various mosquito-borne diseases. The STH-PAS system was more sensitive in detecting dengue infection compared to Taqman real-time RT-PCR: for DENV - 1,2 and 3 by one to 2 dilutions higher, and for DENV-4 by 2-4 dilutions higher (European Journal of Clinical Microbiology & Infectious Disease. 2019 Mar; 38(3): 515-521). The plasma levels of matricellular proteins including galectin-9 (Gal-9) and osteopontin (OPN) were found to reflect the disease severities in the dengue virus and other DIRDs (J Clin Virol. 2013 Dec; 58(4): 635-40) (Thromb Res. 2014 Aug; 134(2): 449-454). Because both proteins have been reported to be immune-check molecules, their inhibition might enhance the immune system against pathogens. We found that brefelamide derivatives could inhibit OPN and other inflammatory molecules synthesis. (Int Immunopharmacol. 2019 Oct; 75: 105831). Very recently, different derivatives were found to inhibit PD-L1 transcription. Applications of these agents should be considered as multi-step strategies against DRIDs.

Keywords: Disaster, Tropical infectious diseases, AIDS, Tuberculosis, Galectin 9, Berefelamide

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